

JAN 04 2008

Serial No. 10/821,102..... Page 2

IN THE SPECIFICATION:

Please replace paragraph 13, page 3 with the following amended paragraph:

Figure 1A-1B is a functional block diagram of an illustrative embodiment of Space Frequency with Space Time Adaptive Processing (SPAP-T) implemented with dynamic weight processing in accordance with the teachings of the present invention.

Please replace paragraph 16, page 3 with the following amended paragraph:

Figure 1AC-1D is a simplified block diagram of a space frequency/time adaptive dynamic weight processor implemented in accordance with an illustrative embodiment of the present teachings.

Please replace paragraph 27, page 3 with the following amended paragraph:

Figure 3A-3D is a block diagram with shows an illustrative implementation of a simplified 2 channel SFAP system using dynamic weight processing in accordance with the teachings of the present invention.

Please replace paragraph 3, page 4 with the following amended paragraph:

Figure 5A-5B is a block diagram which illustrates how the SFAP-T capability is formed by adding a STAP function to each bandpass filter in accordance with an illustrative embodiment of the present teachings.

Serial No. 10/821,102..... Page 3

Please replace paragraph 21, page 4 with the following amended paragraph:

Figure 1A-1B is a functional block diagram of an illustrative embodiment of Space Frequency with Space Time Adaptive Processing (SPAP-T) implemented with dynamic weight processing in accordance with the teachings of the present invention. While Fig. 1A-1B shows a two channel implementation, those skilled in the art will appreciate that the present teachings are not limited thereto. Multiple channels may be provided without departing from the scope of the present teachings.

Please replace paragraph 26, page 4 with the following amended paragraph:

As shown in Figure 1A-1B, the received GPS plus jamming signals from the antenna outputs are down converted to baseband in I (in-phase) and Q (quadrature) detectors in each of the 2 channels. The baseband I1 and Q1 signals are digitized using high speed 12 bit A/D converters (not shown) and applied to a bank of digital filters 1 of which 40 are shown in the illustrative embodiment, each implemented as a 255 KHz wide, 128 tap, Kaiser-Bessel windowed digital FIR (finite impulse response) filter. In the illustrative embodiment, the combined filter bandwidth of the 40 filters covers a bandwidth of 10.2 MHz. Channel 2 contains a similar set of 40 digital bandpass FIR filters 17. In addition, channel 2 contains another bank of 40 bandpass FIR filters 3 that are driven by time delayed versions of the I2 and Q2 signals. This delayed signal processing is used to form STAP processing (Space Time Adaptive Processing) in each of the bands.

Please replace paragraph 14, page 6 with the following amended paragraph:

As shown in Figure 1A-1B, the outputs of the Satellite Processing FIR Bandpass Filters 7, 9, and 23 are summed in 13. The output of the summer contains the reconstructed satellite carrier signal (when the locally generated PN code is aligned with

Serial No. 10/821,102..... Page 4

the received satellite PN code) with spatial nulls (in the adapted antenna pattern) towards the jammers and beams towards the satellites.

Please replace paragraph 24, page 6 with the following amended paragraph:

Figure 1A-1D is a simplified block diagram of a space frequency/time adaptive dynamic weight processor implemented in accordance with an illustrative embodiment of the present teachings. The processor 10 includes an array 12 of antenna elements of which only two are shown 14 and 16. In the illustrative embodiment, the array 12 is a five element (i.e. five channel) CRPA (Controlled Reception Pattern Antenna). Those skilled in the art will appreciate that the present invention is not limited to the number of elements in the antenna array. Likewise, in the illustrative embodiment, the antenna elements are adapted to receive GPS signals. Nonetheless, the present invention is not limited to GPS applications, as will be appreciated by those of ordinary skill in the art.

Please replace paragraph 30, page 8 with the following amended paragraph:

As shown in Figure 1A-1B, the equalizer coefficients are combined with the FIR filter coefficients in the bandpass filter and coefficient convolution calculator 58 to form a new set of filter coefficients that are used to generate the dynamic weights.

Please replace paragraph 1, page 15 with the following amended paragraph:

Figure 3A-3D is a block diagram with shows an illustrative implementation of a simplified 2 channel SFAP system using dynamic weight processing in accordance with the teachings of the present invention. Nulling and beamforming is implemented in one band, for satellite 1. The diagram is partitioned into 3 sections as shown. The left section shows how the bandpass filter is formed with dynamic weight processing in channel 1 (the reference channel) and channel 2 (the auxiliary channel). The middle section shows nulling and beamforming for satellite 1. An LMS algorithm is shown for descriptive

Serial No. 10/821,102..... Page 5

purposes. The right side of Figure 3 shows the satellite 1 Dynamic Weight Processing. Referring to the upper left portion of the figure, weight table "A" 134 contains the weight values that form a 255 KHz wide, 128 tap Kaiser Bessel FIR filter translated to bandpass 1. The adder 135, along with the PN shift register 132, is used to form the dynamic weight which is applied to the I₁ and Q₁ correlating multipliers 124 and 126 respectively as shown. The summed output of these multipliers (see summer 128) forms the 255 KHz wide band pass filter in band 1, for channel 1, with the response of a 128 tap Kaiser Bessel windowed FIR filter.

Please replace paragraph 11, page 17 with the following amended paragraph:

Figure 5A-5B is a block diagram which illustrates how the SFAP-T capability is formed by adding a STAP function to each bandpass filter in accordance with an illustrative embodiment of the present teachings. The left side of Figure 5 shows the addition of a second processing tap to band pass 1, in RF channel 2. As can be seen a time delayed version of the input signal is derived from I₂ and Q₂ and applied to multiplying correlators 147 and 149 that use the same dynamic weight that is used in the non-delayed path in band 1, channel 2. The delay path correlator outputs are combined and applied to nulling and beamforming weights. To form a 2 tap SFAP-T function, that provides nulling and beamforming in the 255 KHz band, the output of the nulling weight set in the delayed path is added to the nulling algorithm as shown.